

IN THE CLAIMS

Please amend the claims as follows:

Claims 1-15 (Canceled).

Claim 16 (Currently Amended): A production apparatus of a carbon fiber precursor fiber bundle, ~~characterized by~~ comprising:

an intermingling device that comprises a yarn channel having a flat rectangular section capable of passing a plurality of small tows which are adjacent to each other and that comprises a plurality of air jet holes which are disposed with a predetermined interval along the long side direction of the flat rectangle and which open into the yarn channel, and

a groove which extends along the lengthwise direction of the yarn channel and which opens into the yarn channel at a position where the plurality of small tows are adjacent to each other,

wherein the groove has a trapezoidal or semicircular form.

Claim 17 (Canceled).

Claim 18 (Currently Amended): A production apparatus of a carbon fiber precursor fiber bundle, ~~characterized by~~ comprising:

a first intermingling device that comprises a yarn channel having a circular section capable of passing a small tow and that comprises one or more air jet holes for jetting out air into the yarn channel; and

a second intermingling device that comprises a second yarn channel having a flat rectangular section capable of passing a plurality of small tows which are adjacent to each

other and that comprises a plurality of air jet holes which are disposed with a predetermined interval along the long side direction of this flat rectangle and which open into ~~this~~ the second yarn channel.

Claim 19 (Currently Amended): A production apparatus of a carbon fiber precursor fiber bundle, ~~characterized by~~ comprising:

a first intermingling device that comprises a yarn channel having a flat rectangular section capable of passing a small tow and that comprises one or more air jet holes for jetting out air into the yarn channel; and

a second intermingling device that comprises a second yarn channel having a flat rectangular section capable of passing a plurality of small tows which are adjacent to each other and that comprises a plurality of air jet holes which are disposed with a predetermined interval along the long side direction of this flat rectangle and which open into ~~this~~ the second yarn channel, and

wherein the second intermingling device comprises a groove which extends along the lengthwise direction of the second yarn channel and which opens into the second yarn channel at a position where the plurality of small tows are adjacent to each other,

wherein the groove has a trapezoidal or semicircular form.

Claim 20 (Currently Amended): The production apparatus of a carbon fiber precursor fiber bundle according to ~~claims 18 or 19~~ claim 18, wherein the second intermingling device further comprises a groove which extends along the lengthwise direction of the second yarn channel thereof and which opens into the second yarn channel at a position where the plurality of small tows are adjacent to each other.

Claim 21 (Original): The production apparatus of a carbon fiber precursor fiber bundle according to claim 20, wherein the air jet holes of the second intermingling device open only into the groove.

Claim 22 (Original): The production apparatus of a carbon fiber precursor fiber bundle according to claim 16, wherein the ratio $n \cdot D/L$ of the total fineness nD (dTex) of an aggregate of tows represented by the product between the total fineness D (dTex) of the small tow and the number n of the small tows to be aggregated to the long side dimension L (mm) of the flat rectangular section is 2,000 dTex/mm or more and 12,000 dTex/mm or less, and the diameter of each of the air jet holes is 0.3 mm or more and 1.2 mm or less.

Claim 23 (Original): The production apparatus of a carbon fiber precursor fiber bundle according to claim 16, wherein the air jet holes are disposed with an even pitch, and the pitch is 0.8 mm or more and 1.6 mm or less, and the length of the yarn channel is 10 mm or more and 40 mm or less.

Claim 24 (Currently Amended): The production apparatus of a carbon fiber precursor fiber bundle according to ~~claims 17 or 20~~ claim 16, wherein the groove has a sectional shape of a part of a circle, and the diameter of the circle is 2 mm or more and 10 mm or less, and the depth of the groove is 1.5 mm or more and 4 mm or less.

Claim 25 (Currently Amended): The production apparatus of a carbon fiber precursor fiber bundle according to ~~claims 17 or 20~~ claim 16, wherein the groove has a trapezoidal sectional shape, and the dimension of the long side of the trapezoidal groove section is 2 mm

or more and 10 mm or less, and the dimension of the short side corresponding to the groove bottom is 1.5 mm or more and 6 mm or less.

Claims 26-30 (Canceled).

Claim 31 (New): The production apparatus of a carbon fiber precursor fiber bundle according to claim 20, wherein the groove has a sectional shape of a part of a circle, and the diameter of the circle is 2 mm or more and 10 mm or less, and the depth of the groove is 1.5 mm or more and 4 mm or less.

Claim 32 (New): The production apparatus of a carbon fiber precursor fiber bundle according to claim 20, wherein the groove has a trapezoidal sectional shape, and the dimension of the long side of the trapezoidal groove section is 2 mm or more and 10 mm or less, and the dimension of the short side corresponding to the groove bottom is 1.5 mm or more and 6 mm or less.

Claim 33 (New): A production apparatus of a carbon fiber precursor fiber bundle, comprising:

an intermingling device that comprises a yarn channel having a flat rectangular section capable of passing a plurality of small tows which are adjacent to each other and that comprises a plurality of air jet holes which are disposed with a predetermined interval along the long side direction of the flat rectangle and which open into the yarn channel, and

a groove which extends along the lengthwise direction of the yarn channel and which opens into the yarn channel at a position where the plurality of small tows are adjacent to each other,

wherein the groove is on the same face as the air jet holes connected to the yarn channel.

Claim 34 (New): A production apparatus of a carbon fiber precursor fiber bundle, comprising:

a first intermingling device that comprises a yarn channel having a flat rectangular section capable of passing a small tow and that comprises one or more air jet holes for jetting out air into the yarn channel; and

a second intermingling device that comprises a second yarn channel having a flat rectangular section capable of passing a plurality of small tows which are adjacent to each other and that comprises a plurality of air jet holes which are disposed with a predetermined interval along the long side direction of this flat rectangle and which open into the second yarn channel, and

wherein the second intermingling device comprises a groove which extends along the lengthwise direction of the second yarn channel and which opens into the second yarn channel at a position where the plurality of small tows are adjacent to each other,

wherein the groove is on the same face as the air jet holes connected to the second yarn channel.